

# Stochastic Analysis on Path and Loop Spaces Over a Riemannian Manifold

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**Abstract** — Stochastic analysis on the path and loop spaces over a Riemannian manifold is based on the Wiener measure on these spaces. Since the Wiener measure is the law of Brownian motion, such analysis can take full advantage of stochastic calculus as developed by Ito and Malliavin. When the underlying space is the flat Euclidean space, such analysis is equivalent to the analysis of infinite dimensional Gaussian measures. In contrast, our investigation concentrates on those results in which the curvature of the underlying manifold plays a role. We will illustrate this general philosophy by discussing several topics, including Bismut's formula, quasi-invariance of the Wiener measure, logarithmic Sobolev inequality, and mass transportation problems.

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